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ABSTRACT

This applied dissertation was designed to help fourth-grade teachers successfully integrate computer-related technology into the curriculum. The fourth-grade teachers did not incorporate student use of technologies into the curriculum-related activities or plan lessons collaboratively with the researcher. There was no correlation between classroom lessons and student use of media resources. The students had little training in any research skills. The author developed a combination of strategies to improve computer technology use in the curriculum with the fourth-grade teachers. These strategies included planning and teaching computer and research skills to the students, providing ongoing training for teachers at the workplace, collaborating with teachers to plan units of study, providing peer tutoring for teachers and students, and inviting community leaders and parents to share their knowledge and interest in technology. Teachers were encouraged to continue collaborative planning with the researcher so that computer technology would become a valuable tool for the school. An analysis of the data revealed that all of the outcomes set forth for this applied dissertation were met. The teachers learned how to use presentation software and electronic resources, and the students mastered all of the research skills taught. The most exciting and successful activities involved students in researching and gathering information in different formats as they learned about other countries. A culminating research project integrated all of the skills taught during the implementation period. Appended are student worksheets and evaluation checklists. (Contains 101 references.) (Author/AEF)

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ED 456 831

Increasing the Integration of Technology into the Fourth-Grade Curriculum Using Teacher/Media Specialist Collaboration in Planning Student Research Activities

By
Peggy McRae
Cluster 8

An Applied Dissertation
Presented to the Ed.D. Program in Instructional Technology
And Distance Education in Partial Fulfillment of the
Requirements for the Degree of Doctor of Education

P. McRae

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Approval Page

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June 28, 2001
Date of Final Approval

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Abstract

Increasing the Integration of Technology into the Fourth-Grade Curriculum Using Teacher/Media Specialist Collaboration in Planning Student Research Activities. McRae, Peggy, 2001: Applied Dissertation, Nova Southeastern University, Ed.D., Program in Instructional Technology and Distance Education. Automated card catalog / reference skills / CD-ROM encyclopedia / word processor/elementary school / peer tutoring / computer/collaboration/teachers / computer technology/elementary school / technology/education

This applied dissertation was designed to help fourth-grade teachers successfully integrate computer-related technology into the curriculum. The fourth-grade teachers did not incorporate student use of technologies into curriculum-related activities or plan lessons collaboratively with the writer. There was no correlation between classroom lessons and student use of media resources. The students had little training in any research skills.

The writer developed a combination of strategies to improve computer technology use in the curriculum with the fourth-grade teachers. These strategies included planning and teaching computer and research skills to the students, providing ongoing training for teachers at the workplace, collaborating with teachers to plan units of study, providing peer tutoring for teachers and students, and inviting community leaders and parents to share their knowledge and interest in technology. Teachers were encouraged to continue collaborative planning with the writer so that computer technology would become a valuable tool for the school.

An analysis of the data revealed that all of the outcomes set forth for this applied dissertation were met. The teachers learned how to use presentation software and electronic resources, and the students mastered all of the research skills taught. The most exciting and successful activities involved students in researching and gathering information in different formats as they learned about other countries. A culminating research project integrated all of the skills taught during the implementation period. Appended are student worksheets and evaluation checklists developed by the writer.

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Chapter I: Introduction

Description of Community

The writer's work setting is an elementary school in a small agricultural county located in the lower portion of the southeastern United States. Agriculture constitutes the main source of income, particularly onion farming. Dependence on seasonal workers contributes to the large migrant population that the schools serve.

The socioeconomic level of the population ranges from professional upper middle income to low income. This population includes parents who are both working, single parent families, and families on federal assistance. The majority of families of these school children fall into the low-income category.

The public school system consists of one countywide district that serves approximately 2800 students. There are two elementary schools serving kindergarten and grades one through five, a middle school serving students in grades six through eight, and a high school serving students in grades nine through twelve.

Writer's Work Setting

Erected in 1955 and renovated in 1987, the school was a K-12 institution until 1987. At that time it became an elementary school, following consolidation of the two county high schools. It is not only the center of education for the southern county area, but also the heart of recreational and social activities. For example, class and family reunions as well as various community club meetings are held at the school.

The elementary school has 37 certified classroom teachers, with nine holding advanced degrees. The principal, assistant principal, library media specialist, and

counselor complete the full time positions. Part-time music and gifted teachers also serve the student body.

The population of 500 students is diverse and multi-cultural. The racial/ethnic composition of the students is 11% African American, 18% Hispanic, and 71% White. Seventy-seven percent of the children are eligible for free and reduced price lunches, with an average household income of $19,500.

The school's mission is to ensure that all students are equipped to become life-long learners and contributing members of society, by providing a motivated, caring, professional staff who render a challenging, innovative, appropriate curriculum in a positive, safe, nurturing environment. Most parents support the school's mission.

The media center is the hub of the school. It houses all the instructional materials and is the location for the school's file server and equipment. The center is centrally located within the school and the media center staff is comprised of one full-time media specialist. To offset the lack of help in the center, parent volunteers and students are utilized.

Writer's Role

The writer's role in the elementary school is that of media specialist for the faculty, staff, and students. The media specialist teaches information skills to the students, assists teachers with instructional strategies, and encourages teacher collaboration in lesson planning.

At the elementary school level, the writer is chairperson for the media and technology committees, and she also serves as co-chairman on the decision making school-wide committee. The writer develops and disperses the instructional budget for

kindergarten through fifth grade. At the system level, the writer serves on the media and technology committee.

The writer conducts weekly library media classes with each grade and helps with technology problems as time permits. At the present time, the system has no certified technology specialist.

Chapter II: Study of the Problem

Problem Statement

The problem was that fourth-grade teachers were not integrating computer-related technology into the curriculum.

Problem Description

The fourth-grade teachers did not incorporate student use of technologies into their curriculum. They also did not plan lessons collaboratively with the writer. There was no correlation between classroom lessons and student use of media resources. The students had little training in any research skills.

Technology integration at the school was just beginning to occur and was moving at a slow pace. Seven teachers participated in a training workshop called "Integrating Technology" (INTECH) that was mandated by the state department of education. All of the classroom teachers will attend this 10-week workshop over the next several years. Sessions concentrated on helping teachers learn how to integrate computer-related technology into the different curriculum areas. Past staff development programs for this faculty centered on traditional methods. Because traditional methods did not include technology integration, teachers lacked a working knowledge of collaboratively planning technology lessons with the writer.

The school was at a disadvantage because Internet access was not available. However, through the use of E-rate funds, universal service discounts, the school was connected to the Internet by the end of the school year. E-rate funding was part of President Clinton's initiative to connect all schools to the Internet (Boethel, Dimock, & Hatch, 1998).

The computer lab was connected to the media center network file server. Also, each classroom had one computer connected to the network file server. From the classroom, the students and teachers accessed the Accelerated Reader Program, a computer software reading program, and the automated card catalog that was part of the automated library circulation system. However, these resources were virtually unused for curriculum-related activities by teachers.

Problem Documentation

The types of evidence presented were test results, survey results, checklists, and lesson plans. The writer developed two tests for use in determining whether the fourth-grade students could use an automated card catalog. She administered each test to two of the four classes as a pretest (see Appendix A) and allowed 30 minutes for completion by the students. Most of the students could not answer these questions correctly because they did not know how to access the electronic card catalog properly. The test results showed that 12 of 72 fourth-grade students could use the automated card catalog to find information.

The writer designed a computer skills checklist (see Appendix B) to assess students' skills in locating and using information in CD-ROM encyclopedias. The writer observed the students at work and marked a checklist for each student. Results of the observation indicated that 9 of 72 students could locate articles and find related resources.

The above described observation method was used to assess students' ability to enter a word processing program, type a paragraph, and print the paragraph. Results as

indicated on the checklist (see Appendix B) showed that none (0 of 72) of the students could complete all three tasks to produce a typed paragraph.

On a teacher survey of computer use (see Appendix C) administered to the four fourth-grade teachers, none (0 of 4) agreed with statement 16 ("I believe that I effectively use the computer in my classroom").

Further evidence of the problem was obtained when the writer gathered information from her personal lesson plans. At the end of the 15th week of the current school year, the writer reviewed her lesson plans and determined that none (0 of 4) of the fourth-grade teachers had planned lessons collaboratively with her. All lessons were isolated media activities.

From reviewing 15 weeks of the writer's lesson plans, the writer determined that none (0 of 4) of the fourth-grade teachers had incorporated student use of technologies into the curriculum. No subject-related technology activities had been included.

Causative Analysis

Five causes contributed to the stated problem. The first cause was that there was no correlation between classroom lessons and student use of media resources. It was recognized through the personal observation of the writer that students did not often use media resources in the media center. Further investigation, through informal interviews between the fourth-grade teachers and the writer, established that lack of time was the main reason. The teachers said that they did not have enough time to plan lessons with the writer.

The second cause was that fourth-grade students have had no instruction in using a CD-ROM encyclopedia. The writer observed that the students used only print

versions of encyclopedias to find information when visiting the media center. The writer further investigated by checking the school's software catalog. She found that the school did not own enough copies of CD-ROM encyclopedias to distribute to all classrooms, the computer lab, and the media center. This was the main reason that fourth-grade students had not been taught how to use the CD-ROM encyclopedia.

The third cause was that fourth-grade students have had no instruction on how to use a word processor. The writer observed that the students did not use a word processor when working on reports. Further investigation through informal discussions between the classroom teachers and the writer confirmed that they were not requiring student reports to be completed by using a word processor. The teachers said that there was not enough class time available for students to type their reports and that the majority of the students did not have word processing programs at home.

The fourth cause was that teachers have had insufficient training in integrating computer-related technology into the curriculum. Through personal observations, the writer discovered that the fourth-grade teachers were not transferring learning from the training site to the workplace. She further investigated by conducting informal interviews with the teachers. It was revealed that it was inconvenient to travel a long distance to attend a technology workshop that might not meet their needs. At the time of the applied dissertation, the four fourth-grade teachers attended their first relevant training course in integrating technology into the curriculum.

The fifth cause was that there was no collaboration for computer-related technology-based learning. The writer noticed through personal observations that there was no shared planning among the teachers, the media specialist, and the computer lab

instructor. Further investigation through informal interviews between the teachers and the writer confirmed that the fourth-grade teachers thought that they did not know enough about technology-based learning to collaborate with others. They felt very insecure about discussing any technology issue.

Relationship of the Problem to the Literature

The topic areas researched were automated card catalog, reference skills, CD-ROM encyclopedia, word processor/elementary school, peer tutoring, computer/collaboration/teachers, computer technology/elementary school, and technology/education.

Educators and students are living in the Information Age (Best & Bailor, 1996). Schools, however, are not living up to the potential of the Age. Schools must restructure and make changes now if they are to continue as the primary centers for student learning (Bolton, 1994).

The United States has thousands of databases that allow immediate access to information and the most technologically advanced communications systems world-wide, but its technology literacy level is low compared to that of other industrialized nations (Wilson, as cited in Christy, 1994). Undoubtedly, if people do not have the information skills needed to use technology, it cannot be effective. To ensure that future generations acquire the knowledge to use available technology, teaching must begin in the elementary schools in the area of accessing electronic information (Best & Bailor, 1996; Burnett & McNally, 1994).

Although the technological revolution has enhanced greatly the efficiency of industry, business, and publishing, it has had little impact on the classrooms of America

(Smith & Ragan, 1999; Snider, 1992). The importance of technology in all areas of society makes it incumbent on educators to employ technology in the classroom in order to prepare students for the challenges of the real world (Jordan & Follman, 1993; Means, Olson, & Singh, 1995; Papert, 1993). Nonetheless, few teachers have integrated computers in their teaching activities (Marcinkiewicz, 1994; Rosen & Weil, 1995).

Many educators do not employ technology in the classroom. President Clinton (1997) in his educational proposals for the year 2000 said, "Preparing our children for a lifetime of computer use is now just as essential as teaching them to read and write and do math.... and about half of all teachers have little or no experience at all with technology in the classroom" (p. 40). Despite the consensus as to the benefits of computer technology education, students use computers on average little more than one hour per week or 4% of all instructional time (Becker & Cuban, as cited in Bolton, 1994). Becker (1993) found in a large national survey that when elementary students do use computers, they do so overwhelmingly more often in an exercise mode, doing drills and playing various educational games, than in a productivity mode. The writer's experience supports these findings. When she walks through her school, she often observes idle computers or students playing computer games in the classrooms.

Teacher attitudes have influenced technology integration (Bradley & Russell, 1997; Jordan & Follman, 1993) and teachers vary in their attitudes concerning technology use in the classroom (Gardner, Discenza, & Dukes, 1993). A teacher's attitude toward technology use and integration plays a critical role in the effective implementation of technology in the classroom (Gaynor & Vescuso, 1998; Jordan & Follman; Marchinkiewicz, 1994; Sheingold & Hadley, 1990).

Negative attitudes toward technology are a major impediment to its implementation in schools (Becker, 1991; Mather, 1996; Pancer, George, & Gebotys, 1992; Rosen & Weil, 1995). Computer anxiety frequently affects user motivation and ability to master computer skills (Jordan & Follman, 1993), and this anxiety must be addressed in order to change teachers' attitudes about the use of technology. Loveless (1996) and Maurer (1994) suggested that experience with computers seems to be a positive force in reducing computer anxiety. In a study conducted by Davidson and Ritchie (1994), the baseline attitudes of teachers, students, and parents toward computers in an elementary school were determined. After one year of computer implementation, these groups were surveyed to determine if changes in their attitudes had occurred. Results of the study suggest a significant positive increase in teacher, student, and parent attitudes toward computers. Computers can be more effectively implemented into the classroom curriculum when students, teachers, and parents have positive attitudes and low anxiety levels.

Traditional methods of instruction are still used in schools. "In 1997, only 3% of schools nationwide had fully integrated technology into the classroom" (STaR Report, as cited in the CEO Forum, 1997, p. 7). Few recent teacher education graduates considered themselves very well prepared to use technology in the classroom. Teachers who are unfamiliar with educational technology may resist it because they feel that technology interferes with, or even corrupts, the traditional teacher-to-student classroom lecture model (Cummings, 1995; Poole, 1997; White, 1999). According to Poole, current theories of learning and cognitive development are very relevant to the application of computers in the classroom. There has been growing support for the

theory of learning which maintains that teachers should encourage retention and transfer of learning activities (Forcier, 1996).

Constructivism is the perspective advocated by cognitists (Forcier; Knapp & Glenn, 1996; Simonson & Thompson, 1997), who view education as interwoven with ordinary life because learners are driven by curiosity about the world (Poole, 1997). In constructivism, students are active participants in developing their own knowledge and skills, and teachers serve as mentors, models, and resources for students (Callison, 1998; Knapp & Glenn, 1996; White, 1996). Technology is a major component of a constructivist approach and should be integrated throughout the curriculum. Integrating technology into methods courses in a teacher education program is important because in order to transform teaching, teachers need to implement experiential learning in their classrooms (Falba et al., 1997; White, 1996). First-year teachers who have had methods classes modeled after a constructivist approach are experts in technology applications, and are thus able to teach and model appropriate technology integration to current teachers in the school setting.

Computer-related activities are still not normal occurrences in classrooms. According to Rosen and Weil (1995), between one-third and two-thirds of teachers do not use technology personally or in the classroom. Rosen and Weil suggested that teachers lack the knowledge or confidence to use it. Mather (1996) stated in the 1995 National Education Goals Report, that less than 50% of teachers reported participating in staff development on the uses of educational technology.

A successful technology staff development plan should have the following four components as a foundation: recognition of teachers as professionals; supported

collegiality and collaboration; a focus on teachers' questions, needs, and concerns; and a long-term investment of time and money (Dilworth & Imig, as cited in Gearhart, 1998). Many staff development programs do not meet these criteria.

Woodhouse and Jones (1988) cited four reasons for not integrating technology into the curriculum. The first reason is lack of facilities. Computers are usually housed in a computer lab in the school and are therefore more difficult to integrate into classroom instruction. Classrooms that have computers usually have only one or two.

The second reason named by Woodhouse and Jones (1988) is lack of support. Teachers lack guidance in proper computer use. Limited administrative and technical support for integrating unfamiliar technologies into the curriculum can cause low risk tolerance (Standish, as cited in Shegog, 1999). Standish emphasized that administrators must be supportive for technology integration to occur (p. 128). Teachers will be less innovative and less willing to take risks if the necessary support is not available. To develop the ability to match the technology with the curriculum, teachers need to be encouraged to take risks (Goodson, as cited in Park, 1994). Senge (1990) said that leverage comes from the individual. In order to improve, the individual teacher must be willing to face the challenges of using technology.

The third reason mentioned by Woodhouse and Jones (1988) is the lack of knowledge of instructional strategies. Teachers have great difficulty trying to tie the use of the computer to the traditional lecture approach to teaching. New instructional strategies integrating computer technology into the curriculum are a must. Teachers need to remodel their teaching practices.

One successful model of planning is the ASSURE model. It is intended to assure effective use of media in instruction (Heinich, Molenda, Russell, & Smaldino, 1999; Russell, Sorge, & Brickner, 1994). "ASSURE is an acronym for these actions: Analyze learners, State objectives, Select media and materials, Utilize materials, Require learner participation, Evaluate and review" (Gustafson & Branch, 1997, p. 41).

Regardless of the selected model, the instructional strategy should not bewilder the learners. Exercises should be simple, with time to practice. For example, a beginning word processing session might include logging on, opening the program, typing a short paragraph, saving, and printing it (Gearhart, 1998).

The fourth reason referred to by Woodhouse and Jones (1988) is a basic lack of knowledge about how computers work or how to operate them. Most training sessions for teachers are brief and held away from the work site with little hands-on experience. The way in which a training session is conducted can encourage or discourage participants. Sometimes training instructors "talk above the heads" of participants or move too fast during a session; consequently, many participants leave saying the whole experience was a waste of time.

Furthermore, computer technology training often is not presented in ways that are directly related to teaching and learning. In one study, 90% of computer training was found to be ineffective because of the absence of practice and follow-up support (Larner & Timberlake, 1995). Many teachers have no release time to apply what they learned in training. They also have no proper follow-up support for implementation of technology skills learned in training. Teachers have limited access to resources needed to implement what they learned in training (Sherman, 1998).

"The training and practice time required to move a teacher from beginning levels of computer use to a point at which he or she feels capable of curriculum change is estimated to be approximately 1,000 hours" (Roberts, Carter, Friel, & Miller, as cited in Jordan & Follman, 1993, p. 14). Sheingold and Hadley (1990) found that technology integration has to be implemented gradually and steadily for success to occur; technology integration must be used daily. McKeown (1990) said, "You just can't give technology to teachers, you also have to give them school time to explore it, become comfortable with it, talk about it" (p.5).

There are too few computers in the classroom for the number of students who want to use them. Only 4% of schools have a computer for every five students (Clinton, 1997). A skillful computer user without a computer in his or her room is not going to be very effective (Sammons, 1994). It is crucial for teachers and students to be able to use the knowledge they possess, and without proper hardware it is impossible. Novak and Knowles (as cited in Larner and Timberlake, 1995) conducted interviews and observations with teachers. They concluded that teachers felt stifled by limited computer equipment when their classrooms had only one computer. Moreover, this deficiency prevents scheduling ample computer time for student use, which in turn prevents teachers from attempting to incorporate computers into their daily lesson plans (Hoffman, 1997; Poole, 1997).

In addition to low quantity of computers for classrooms and poor access to computers in labs, another hindrance to technology usage is the quality of available technologies. "Hardware, software, and network capabilities are constantly changing and improving; schools that made major technology purchases five years ago may find

that equipment out-of-date" (Ritchie, 1996, p. 46). At the writer's workplace, the combination of limited resources for purchasing computers and the need to frequently replace out-of-date computers has caused the original goal of equipping each classroom with five computers to remain unreached.

Peer tutoring programs practiced in some classrooms can encourage teachers to integrate computer technology into their daily activities and can be used with teachers and students. This type of mentoring is special because it benefits both the tutor and the trainee throughout the learning process. Both partners learn cooperation and responsibility (Sills & Soden, 1997; Umbach, 1998).

In one study, 85% of the mentoring teachers agreed that they had increased their knowledge about integrating computers with instruction, and most of the teachers who were mentored agreed that they had learned more from their mentors than from traditional inservice courses (MacArthur et al., 1996). Teachers become technologically proficient through school-centered learning because the key trainers are those in the next classroom (Mergendoller, 1996). A major concern is finding teachers who are willing to become mentors and to take the time for training.

Eggers (1995) provided five key features of a strong student peer tutoring program: class preparation, tutor selection, tutor preparation, monitoring by the teacher, and continuous assessment of students' progress. Eggers advocated using the "pause, prompt, and praise" (p. 217) method in tutoring students. She suggested that both low and high achieving students should be allowed to become tutors.

The writer uses a peer tutoring program similar to the Eggers' design. Before allowing students to act as mentors in the media center, the writer trains and monitors

them. The writer models the appropriate behavior to use in the media center for the student tutors so that they will be able to model for and monitor the tutees. She has found that students enjoy learning from their peers and that they sometimes learn better and quicker than when they work with adults. This program is so successful that the writer keeps a waiting list of students who want to become tutors in the media center.

Another valuable program is The Computer Mentor Program, which was designed to give long-term, on-site support focused on teachers' individual needs and the technology resources available at particular schools (MacArthur et al., 1996). This program includes a course for mentors and a workshop for their trainees.

When the department of education in the writer's state developed and initiated the INTECH training program in 1998, each school could send seven interested teachers to the sessions. After completing the program, many of these teachers (mentors) train their co-workers. INTECH is an effective program; however a major problem is getting teachers to dedicate the time and make the effort. One teacher confided to the writer that she did not mind attending workshops but having to teach other teachers at the site is not something she wants to do.

Teachers do not collaborate with other teachers, the media specialist, and the computer lab instructor to use technology in the classroom curricula. Collaboration is a key theme in developing partnerships for learning (American Association of School Librarians, 1998; Pappas, 1997) that "allows people with diverse viewpoints and different expertise to generate more ideas, alternatives, and solutions to mutually agreed upon goals" (Aronson, 1996, p. 32). When the classroom teacher, the media specialist, and the computer lab instructor work together to improve technology integration in the

curriculum, a more effective decision than the one that would have been reached independently may be formed. Senge (1990) said that in dialogue many people actually think that they are " building something" (p. 245) in addition to forming a deeper understanding. Each person brings to the discussion his or her individual ideas, skills, and expertise, but there is a shared sense of responsibility for improving instruction, and this sharing of ideas produces better outcomes for all students (Aronson; Beasley, 1996).

Many teachers do not use cooperative and collaborative learning with their classroom curricula (Callison, 1997). Most classroom teachers have too little time to prepare and collaborate with others in the learning community (Aronson, 1996). During the typical school day, elementary teachers teach six or more subjects and take students to lunch, recess, restrooms, physical education, and music; additionally, they must plan for the next day. Little or no time is built into the schedule for collaborative planning. When teachers are off-duty they finish chores that they did not have enough time to complete during the school day (Cain, 1995; Poole, 1997).

Time is a crucial factor for building collaborative relationships. True collaborative work cannot happen on the run, in the halls, or in the teachers' lounge. To insure effective collaboration, administrators need to support collaborative planning by allowing time during the school day for collaborative efforts. Smith and Scott, as cited in Aronson (1996), stated that "collaborative practices have a positive effect on student performance. In schools where the adults model a collaborative work environment, students are more likely to demonstrate student cooperation in the classroom" (p. 33).

Students who use library technologies to find materials and information are better prepared to access information more quickly and efficiently. Today's students will be the workforce of the 21st century. They have to be skilled consumers and producers of information in a range of sources and formats to thrive personally and economically (Christy, 1994; Davie, 1999; Edmonds, Moore, & Dalcom, 1990). In fact, many of today's jobs require information-processing skills (American Association of School Librarians, 1998). There is a need to de-emphasize memorization and increase problem solving skills (Turner, 1991). With the universe of knowledge expanding rapidly, a school curriculum must be developed which emphasizes the collecting and interpreting of information from a variety of sources (Buboltz & Ling-Louie, as cited in Christy). Students must learn how to learn.

Many students do not use library technologies to find information because the classroom curriculum is not resource-based (Turner, 1991). Information skills are learning tools that are integrated into the classroom curriculum through resource-based instruction. Ideally, the students identify and utilize a variety of formats to obtain information and process that information into a knowledge product (Jansen, 1996; McGuire, 1998; Pappas, 1996). In actuality, this is not often the case. Frequently, the teacher's instruction consists of covering certain pages in the adopted state textbook, followed by questions to answer from the text. Resource-based inquiry learning must be promoted to increase students' ability to access information sources and improve their problem-solving skills.

The literature review revealed that the problem is extensive at all levels of education. Jordan and Follman (1993) stated that technology has become the catalyst

for the transition of the society from the Industrial Age to the Information Age. Likewise, Ellis (1993) reported that unlike most other industries that have been successful in raising productivity by capital investment in technology, the education industry has lagged behind with considerably fewer successes.

The need for implementing computer technology into the classroom is critical to the mission of the writer's workplace if students are to be prepared for living in the 21st century. New methods of teaching and learning will be needed at the writer's school to prepare students for using technology effectively.

Chapter III: Anticipated Outcomes and Evaluation Instruments

Goals and Expectations

The goal was that fourth-grade teachers would successfully integrate computer-related technology into the curriculum.

Expected Outcomes

The following outcomes were projected for this applied dissertation:

1. Sixty-two of 72 fourth-grade students will use the automated card catalog to find information. The measurement is a posttest on the use of the automated card catalog (see Appendix A).
2. Sixty-two of 72 fourth-grade students will use appropriate search strategies to locate articles and related articles to find specific information in a CD-ROM encyclopedia. The measurement will be performance-based assessment, as indicated on student worksheets (see Appendix D).
3. Fifty of 72 fourth-grade students will use a word processing program and successfully type and print a paragraph. The measurement will be performance-based assessment, as indicated by student use of a word processor.
4. Four of 4 fourth-grade teachers will use computer-related technology to teach. The measurement will be performance-based assessment, as indicated on an observation checklist (see Appendix E).
5. Four of 4 fourth-grade teachers will plan lessons collaboratively with the writer. Inspection of the writer's lesson plan book is the measurement tool.

6. Four of 4 fourth-grade teachers will collaborate with the writer in developing a unit of study that includes a student research project. The outcome will be achieved by completion of this unit of study in collaboration with the writer and cooperative participation by all four teachers in conducting computer-related activities.
7. Sixty-two of 72 fourth-grade students will complete a research project based on the unit of study described in Outcome 6. The writer will inspect students' work and indicate completion on an observation checklist (see Appendix F).

Measurement of Outcomes

1. For Outcome 1, the measurement was a posttest on the use of the automated card catalog (see Appendix A). This was a hands-on demonstration of the fourth-grade students' knowledge and skills. The questions were geared toward naming specific titles, authors, subjects, and using call numbers to locate materials. It was a fill-in-the-blank test. Even though the posttest and the pretest were the same, internal validity was not a factor. The length of time between testing periods and the use of two different tests with similar content controlled this factor. Students who took Test 1 as the pretest took Test 2 as the posttest and students who took Test 2 as the pretest took Test 1 as the posttest. The posttest was given in the computer lab during library time.
2. For Outcome 2, the measurement was performance-based assessment, as indicated on student worksheets (see Appendix D). The worksheets were

composed of short answer and fill-in-the-blank type questions. This measurement took four weeks to complete. There were four different worksheets and a different one was completed each week. These worksheets were completed in the computer lab.

3. For Outcome 3, the measurement was performance-based assessment, as indicated by student use of a word processor. This activity was completed in the computer lab. The students logged on, opened the word processor program, typed the paragraph, saved it, and printed it.
4. For Outcome 4, the measurement was performance-based assessment, as indicated on an observation checklist (see Appendix E). The writer checked each skill by marking YES or NO on the checklist during the observation of the teacher as she presented her technology lesson.
5. For Outcome 5, the measurement tool was the writer's lesson plan book.
6. For Outcome 6, the measurement tool was the written report completed by the students.
7. For Outcome 7, the measurement tool was performance-based assessment, as indicated on an observation checklist (see Appendix F). The writer checked each skill by marking YES or NO on the checklist during the observation of the student's completed research project.

Chapter IV: Solution Strategy

Discussion and Evaluation of Solutions

The problem to be solved in the applied dissertation experience was that fourth-grade teachers were not integrating computer-related technology into the curriculum.

The topic areas the writer researched were automated card catalog, reference skills, CD-ROM encyclopedia, word processor/elementary school, peer tutoring, computer/collaboration/teachers, computer technology/elementary school, and technology/education.

The writer conducted a review of the literature and gathered nine possible solutions to the stated problem. The first solution was to plan research activities related to unit study (Christy, 1994; Harris, 1999; Pappas, 1998). Learners cannot obtain information literacy skills independent of content, nor without attention to the link between learning and cognition, the role of individual differences in the learning process, and the contribution information technologies can make to learning (Pappas, 1995b).

Information skills curricula that focus on content usually include objectives that incorporate knowledge of specific resources or tools. For example, students should be able to use an electronic encyclopedia or the automated card catalog to gather information for a research activity (Ala & Carabona, 1992). Ultimately, students will be able to choose resources appropriate for their information needs (Jansen, 1996).

Gooden, as cited in Christy (1994), conducted a study in Newton, New Jersey to determine if search strategy and information gathering skills taught to high school students would be used in their college careers. The study found that there was a

correlation between library research skills taught at one level and those retained at the next. These results suggested that search strategy skills are retained and used as students continue their schooling. Why not teach these skills to younger children so that they can use them to enhance their class work? Because the writer is the media specialist, planning research activities with the classroom teachers is a feasible solution. The writer planned to use this solution.

The second solution was to teach electronic encyclopedia search skills to the fourth-grade students (Albaugh, Piazza, & Schlosser, 1997; O'Brannon, 1997; Vidor, 1996). When searchers implement an analytical search strategy, they direct the electronic encyclopedia to examine the text of articles to look for information related to the words in a search phrase (Maples & Jones, 1991; Mendrinos, 1994). Pappas (1995a) and Safford (1994) said that if students are not taught to construct appropriate analytical search strategies they fail to use these resources to the fullest advantage.

One basic search model that could be used in the library media center to help search for information was the Student as Searcher Model (Duffield, 1996). It placed primary importance on teaching the students to search for their own information. This model required ongoing training to establish and maintain searching skills.

In a study conducted by Stevenson (1993), fourth-and-fifth grade children were observed to see the degree to which they could master the skills needed to operate the CD-ROM database of the New Grolier Electronic Encyclopedia following minimal instruction. The study found that ordinary fourth and fifth graders could benefit from electronic encyclopedia training. These results suggested that sessions should be given to make learning more effective. This solution will be workable because the writer has

used instructional funds to purchase lab packs of CD-ROM encyclopedias and the computer lab is now equipped with multimedia computers. The writer planned to use this solution.

The third solution was to teach fourth-grade students how to use a word processing program (Bangert-Drowns, 1993; Forcier, 1996; Merrill et al., 1996). Becoming a proficient writer can aid a student in receiving the most out of a word processing program because it contributes immensely to the confirmation and assimilation of knowledge (Harris & Graham, 1992). Word processing eases the physical process of revising by eliminating recopying and messy erasures (MacArthur, 1994). It makes teaching and learning to write more enjoyable (D'Odorico & Zammuner, 1993). "Word processing in writing instruction may grant lasting educational benefits to users because it encourages a fluid conceptualization of text and frees the writer from mechanical concerns" (Bangert-Drowns, 1993, p. 69). Foley (1997) stated that 9- and 10-year-old students should be able to write and edit, using " spell check," "copy," "cut," and "paste"; manipulate fonts and font size; and compose original works on the computer.

In a two-year study conducted by Cochran-Smith, Kahn, and Paris (1990), elementary students ranging from 5 to 10 years old worked with their teachers to use a word processor. The study found that many of the subjects observed shifted the focus of their attention from handwriting and neatness to letter-sound relationships in encoding, content and organization, and final editing. These results suggested that young children can benefit from using a word processor. The writer planned to use this solution.

The fourth solution was to provide ongoing training for teachers in the integration of computer technology into the curriculum (Evans-Andris, 1995; Knapp & Glenn, 1996; White, 1999). Teachers must have sufficient opportunity to gain knowledge, familiarity, and experiences with computer equipment and software to use computers successfully in a classroom setting. Through training teachers will learn to use technology as a tool, just as the chalkboard (Umbach, 1998). Ongoing staff development on computer training and guidance is available to most teachers. However, there have been a number of problems regarding staff development with computers, such as individual skill levels, needs, and personal interests. These problem issues should be resolved because staff development is the key component that encourages greater use of technologies in instruction (Knapp & Glenn, 1996; Marcinkiewicz, 1993). Training personnel need to make a strong attempt to familiarize themselves with school environments, teacher needs, and strategies of instruction.

Woodhouse and Jones (1988) gave several suggestions for successful computer technology training. A school should have a school development plan for technology that is not just on paper, but is actively followed. Too many times things are done in a piecemeal manner. The authors recommended that the training segment of the plan should be sequential. The operation of the hardware comes first, the software second, and the appropriate teaching strategy third. They also stated that in the beginning the use of computers should be integrated with such things as card catalogues and student records.

Current staff development practices are limited in pedagogy and are inadequate to effect meaningful changes. Goldenberg and Gallimore's study (1991) offered a

solution to this problem by not conducting quick-fix workshops. Instead, it was suggested to create contexts in teachers' work lives that assist and sustain meaningful changes. "These contexts should consist of engaging teachers in austere examinations of teaching: the concrete challenges and problems they face; the range of possible solutions; and, most important, close examination of whether, over time, there is progress in addressing these challenges" (p.69). It is important to provide intellectual excitement in a workshop.

Onsite technology training is an ideal way to accommodate teachers with their busy schedules. It provides meaningful workshops in the areas of teachers' needs. Training sessions need to be conducted in a non-threatening atmosphere. Brain research has proven a physical reaction to stress in which the indexing capacities are reduced. As a result, the brain's short-time memory and ability to form permanent new memories are inhibited. High stress in a learning situation is counterproductive. "When under stress, the brain produces a high level of cortisol, which actually inhibits cognitive learning. This condition is called downshifting" (Caine & Caine, as cited in Gearhart, 1998, pp. 24-25). It is in the power base of the writer to offer ongoing training because she is a training instructor. The writer planned to use this solution.

The fifth solution was to collaborate with teachers to plan units of study (American Association of School Librarians, 1998; Aronson, 1996; Davie, 1999). Research and practice have confirmed the school library media program's indispensable role in collaborative planning. Because the media program serves all grade levels and content areas, it has a unique outlook on the needs and abilities of all the members of the school's learning community. It is natural that the media specialist initiate

cooperative planning with the teachers in weaving content area goals and information skills into active learning experiences (American Association of School Librarians, 1998; Barron, 1998).

Teachers must be willing to work together and understand that collaboration will be mutually helpful. Collaboration cannot be forced on anyone. When the media specialist and a classroom teacher jointly plan and develop a unit of study the feeling of ownership creates a larger probability of the unit being implemented successfully.

Equality is a necessary part of successful collaboration. Partners must see each other as equals, rather than view one member as the expert with all the answers. True collaboration occurs only when all participants demonstrate a willingness to learn from each other. Dialogue is a necessary ingredient in team learning (Senge, 1990) and all members of the collaborative group must learn to share their ideas. At the same time, members must realize their idea may not be the chosen solution for that situation. At any point in the collaborative process, a partner will be the giver or the receiver (Aronson, 1996; Moody, 1997).

Collaboration can take place anywhere. The key to successful collaboration is not where the meeting takes place, but how often it takes place. The media specialist must collaborate regularly with teachers to develop curricular content that integrates information-literacy skills, to plan instructional activities, and to identify resources that support and enhance the curriculum. The writer used her lunch period to share ideas, by eating with different teachers during the week. Also, she met with teachers during their library times or planning periods, if necessary. It is in the power base of the writer to

offer to collaborate with teachers to plan units of study. The writer planned to use this solution.

The sixth solution was to provide peer tutoring for students and teachers (Eggers, 1995; White, 1999). According to constructivist principles, students tend to understand a problem better if it is approached from an "in-depth, interdisciplinary perspective" (Knapp & Glenn, 1996, p.12) and when they work on project-based activities that stimulate real problem solving (Forcier, 1996; Means & Olson, 1994; Poole, 1997). When a student tutor is able to explain a subject, the tutee usually benefits. Interaction and communication between the tutor and the tutee is very important.

The idea of peer tutoring and training helps the classroom teacher in vital ways, which, in turn, positively affect the student tutor. When teachers form peer tutoring teams in their classrooms, increased learning time and decreased teacher and student ratios occur (Sills & Soden, 1997). Peer tutoring furnishes a flexible avenue for students and teachers to increase their comfort level on the computer and to further integrate computers into the classroom and their daily lives. Peer tutors are a valuable part of the writer's media center program. Because she has no adult help, peer tutors relieve some of the load by checking out and checking in books at the circulation desk, helping students use the automated card catalog, and aiding students in locating books.

One mentoring model discussed by MacArthur et al. (1996) is to provide the school-based support needed to help teachers learn to integrate computers into their curriculum. The key feature of this model is that assistance is provided within the context of a personal relationship and is focused on the individual needs of the tutee.

Using this model seems practical to implement at the writer's site because her setting is isolated and resources are limited. Of course, trained teachers must be willing to share their computer skills and knowledge with others. Because the writer works on a daily basis with teachers and students in the media center, she can incorporate peer tutoring into her program if the students and teachers are willing to participate. The writer planned to use this solution.

The seventh solution was to enlist support from administrators to integrate technology into the classroom curriculum (Norum, Grabinger, & Duffield 1999; Sherman, 1998). If a school is to make efficient use of technology, the principal and other administrators must take the initiative to use technology correctly, share a vision of proper technology use with teachers, and plan for training and support in connection with hardware and software acquisition. Teachers may be more likely to use computers in their classrooms if they receive encouragement from their principal (Evans-Andris, 1996). The writer had no control over administrative support. The writer did not use this solution.

The eighth solution was to provide the release time needed for teachers to apply what they have learned in training (CEO Forum, 1997; Poole, 1997; Sheingold & Hadley, 1990; Sherman, 1998). Time to reflect on the integration of the technology and time to adjust to a new way of teaching is important. Time to learn how to use the hardware and software is necessary. In other words, time to reflect and follow-up on a training class with others at the school site will foster a more positive attitude for learning computer technology. The writer had no control over how much release time a teacher is allowed. The writer did not use this solution.

The ninth solution was to provide sufficient computer hardware in the classroom (Evans-Andris, 1996; Umbach, 1998). Some teachers have one or two computers in their classrooms while others have none. So how can school systems expect teachers to become actively involved in implementing technology into the curriculum? When teachers participate in workshops, they need to have access to computers so that learning can be transferred from the training site to the workplace. If the majority of the computers are in the school's computer lab, that limits the opportunities of the teachers to use computers on a daily basis (Poole, 1997). The writer had no control over the amount of computer hardware in the classrooms. The writer did not use this solution.

Description of Selected Solutions

The writer generated several ideas as a result of reviewing the literature. First, the writer concluded that formal training should be held at the participants' workplace as much as possible. The writer considered an onsite workshop for the teachers. Teachers are given very little time for staff development, and there are competing demands for their time. The idea was to give educators more time to learn and experiment with new technologies so that technology use would improve. The writer planned to use this solution.

Another idea the writer created was to invite community leaders, parents, and families to share with students and teachers their knowledge and interest in technology and how it relates to their job. There was not enough involvement of parents, families, and community leaders in the school setting; therefore, issuing invitations to visit the writer's school could be a starting point for more collaboration. The writer planned to use this solution.

Last, the writer had an additional idea of having substitute teacher funds set aside for allowing teachers to visit other school sites to observe how their teachers integrate technology into the curriculum. This would be extremely useful, but the writer did not have control over how substitute pay was used. She suggested to the staff development committee that they consider this idea in the future. The writer did not use this solution.

After reviewing possible solution strategies proposed by different researchers who studied the problem, the writer selected a combination of strategies to address the problem at this setting. The first solution strategy was to teach computer and research skills to the students (Ala & Carabona, 1992; Harris, 1999). This strategy addressed the lack of correlation between classroom lessons and student use of media resources that existed in the school. Skills lessons were expected to help the students locate information in the automated card catalog (Outcome 1), locate articles in the CD-ROM encyclopedia (Outcome 2), and use a word processing program to type and print a paragraph (Outcome 3).

The second solution strategy provided ongoing training for teachers at the workplace (Evans-Andris, 1995; White, 1999). This strategy addressed the insufficient training in integrating computer-related technology into the curriculum that existed in the school. Ongoing training sessions were expected to help the teachers use computer-related technology to teach (Outcome 4).

The third solution strategy was to collaborate with teachers to plan units of study (Aronson, 1996; Davis, 1999). This strategy addressed the lack of collaboration for computer-based learning that existed in the school. Collaborative planning periods

were expected to help teachers plan lessons collaboratively with the writer (Outcome 5), and develop a unit of study that includes a student research project (Outcome 6).

The fourth solution strategy provided peer tutoring for students and teachers (Poole, 1997; Sills & Soden, 1997). This strategy addressed the lack of modeling and mentoring that existed in the school. Modeling and mentoring were expected to help the students locate information in the automated card catalog (Outcome 1), use appropriate search strategies to locate articles and find related articles in a CD-ROM encyclopedia (Outcome 2), use a word processing program to type and print a paragraph (Outcome 3), complete a research project based on a unit of study described in Outcome 6 (Outcome 7), and help teachers use computer-related technology to teach (Outcome 4).

The fifth solution strategy was to invite community leaders and parents to share their knowledge and interest in technology (American Association of School Librarians, 1998; Freeman, 1999). This strategy addressed the lack of involvement of community leaders and parents in the school setting. It allowed the parents and community leaders to interact on a personal level with the students. Parents and community leaders were expected to help teachers collaborate with the writer in developing a unit of study that includes a student research project (Outcome 6) and help students complete a research project based on the unit of study described in Outcome 6 (Outcome 7).

The literature review provided several solution strategies that the writer used at her workplace to improve computer technology use in the curriculum. Used well, computer technology is a valuable tool for schools. Appropriate use of technology

assists in preparing students for further education, work, and participation in a society that is increasingly dependent on computers and information resources.

Report of Action Taken

During Week 1 of the first month, the writer met with the principal and assistant principal after school to explain the goal and implementation plan of the proposal and with the fourth-grade teachers and the computer lab instructor during their planning periods to explain the goal and implementation plan of the proposal. The writer also explained to the fourth-grade students during their library periods what they would be doing in the coming weeks and months. There were four fourth-grade teachers, one computer lab instructor, and 72 fourth-grade students, who seemed eager and excited to learn.

During the initial meeting with the fourth-grade teachers, the writer explained that all training sessions would take place during their planning periods. Refreshments would be provided during each session. All student activities would be conducted during their regular weekly class periods in the media center or the computer lab.

The writer sent a memo to all faculty members announcing that technology support was available daily in the media center after school or during their planning periods. The writer invited the faculty to observe media classes in session that modeled collaborative teaching and group learning.

During Week 2, the writer began the first of a four-week training period with the teachers on how to use the electronic encyclopedia, the automated card catalog, the word processor, and presentation software. This hands-on training session, which lasted

60 minutes, focused on how to use the electronic encyclopedia, the automated card catalog, and the word processor.

During Week 3, the writer conducted a 60-minute hands-on training session with the teachers on how to use presentation software through a mini-unit called "Using PowerPoint to Present Presentations." The writer gave the teachers instructional guides on how to use PowerPoint software and then introduced PowerPoint basics.

The mini-unit called "Using PowerPoint to Present Presentations" continued during Week 4. The writer taught the teachers how to create a slide show to use in connection with classroom lessons. They also learned how to operate a digital camera. Extra sessions were conducted after school when needed.

During Week 1 of the second month, the fourth-grade teachers used PowerPoint software and hardware to teach a lesson. The writer observed and marked a presentation checklist (see Appendix E) while the teachers presented their lessons. The writer reminded the teachers that if any skills were not accomplished, another teacher who had mastered the skills would give remediation at a later date.

The first teacher taught a lesson on shapes. She used a digital camera to take pictures of different shapes her class found during an outdoor math session. Then she integrated the digital photos into an impressive lesson using PowerPoint. The second teacher taught a lesson on the continents. She came to the writer for extra help in order to learn how to retrieve information and pictures from the Internet to download directly into her PowerPoint presentation. The next teacher taught a PowerPoint lesson (see Appendix G) on verbs. Her technology-integrated lesson was somewhat different from those of the other teachers. After her introduction on verbs, she added a section that

required the students to use the PowerPoint lesson independently. The students had to complete an exercise on verb usage, and they knew if their responses were correct by the clapping sound the teacher added to the correct choice. The writer was impressed by this teacher's ability to integrate technology. The last teacher taught a lesson on manners. She used a digital camera and her students to illustrate the "right and wrong" of classroom rules and manners. The students enjoyed this lesson very much. All four teachers' PowerPoint presentations were well done. The writer took the teachers out to dinner after completing their presentations to celebrate their success and accomplishments. This mini-unit became a cornerstone of the final research project.

During Week 2, the students completed a worksheet called "Which Catalog Card Do You Need?" The writer introduced the review lesson by using the multimedia projector and computer to show the different types of catalog cards. After discussing the types of cards and how they are used, the writer distributed the worksheets and pencils to the students. They were allowed 15 minutes to complete their worksheets and then the writer discussed each item on the worksheet with the students. Classroom teachers assisted as needed.

The above activity allowed the writer to see how much information the students remembered from third-grade activities on the different types of catalog cards. The writer did not want to repeat lessons on the card catalog that were already understood by the students. Students received bookmarks at the close of this session.

The writer and the teachers met to collaboratively plan a mini-unit on the seasons. They discussed and shared ideas for the activities to be included. They

listened respectfully to each other and did not get offended if their idea was not used as a final choice.

The focus of Week 3 was a scavenger hunt. The writer gave students pencils and question cards that included information about authors, titles, or subjects. Next, the students went to the computer lab and accessed the automated card catalog. They looked up the needed information, which helped them locate the items in the media center. After gathering needed information, students returned to the media center to search for their items. Once they had found their items, they took them to their teachers to be checked. The writer assisted the students in the computer lab.

This was an exciting hands-on activity that allowed students to practice using the automated card catalog and finding materials independently. Locating the information on their own gave the students a great sense of accomplishment. All students could not participate in the scavenger hunt at the same time, but there were no discipline problems. While students waited for their turn, they enjoyed observing other students as they searched for their items. The students were eager and excited. Also, the writer and the teachers met to finalize plans for the mini-unit on the seasons.

During Week 4, the students incorporated the use of the automated card catalog as well as other sources such as globes, newspapers, printed encyclopedias, and books to locate information for Lesson 1 of a mini-unit called "Different Seasons."

The writer began this session by sharing a mystery story on drawing conclusions. She discussed the story with her classes and helped them draw conclusions and record clues that might help to uncover the mystery. Next, the writer

told the students to prepare to make another guess after researching and learning the characteristics of the four seasons.

The classroom teachers were responsible for dividing the classes into groups of four before visiting the media center. Teachers also discussed with their students the months that comprise each season and each season's characteristics, such as ice in the winter.

After reading the story and discussing it, the writer separated students into their assigned groups. Worksheets, extra paper, and pencils were distributed, and the writer explained directions for the next part of the activity. The directions stated that they were to complete the worksheet as a group. Each group had a different state to research and record the average temperatures for the months of January and July. Then each group had to choose a country by examining a globe and record the country's average temperatures for the months of January and July. Last, each group had to use a state newspaper to compare the weather in different cities.

Eight students at a time went to the computer lab to use the automated card catalog to find information while other students used the printed encyclopedias, books, or newspapers to conduct research. The writer assisted students in the media center, and the classroom teachers and the computer lab instructor assisted the groups in the computer lab. The writer announced that students might return to the media center any time during the day or after school to work on the assignment. After the groups completed the assignment, they compiled the research into class reference books.

As the writer and classroom teachers observed the groups working collaboratively, they noticed that the students were sharing ideas and resources. They

worked the entire period, and those that did not finish came back during the afternoon recess to complete the assignment. The writer gave students bookmarks for the effort shown in completing this lesson.

The students completed Lesson 2 in the mini-unit called "Different Seasons" during Week 1 of the third month. The writer instructed the students to return to their assigned groups to write a story that incorporated descriptive parts of a particular season. They used dictionaries to check their spelling, thesauruses to find descriptive words, and encyclopedias to check facts. Each group of students developed a story in which the seasons played an important role. They were very descriptive in their writing. Everyone enjoyed listening to each other's stories. The writer and teachers assisted as needed. As a follow-up activity, the teachers had their students work in their original groups in the classroom to create shoebox displays that depicted a scene that represented each season. These projects were displayed in the media center.

The two-week mini-unit was an excellent way to incorporate collaborative planning between the writer and the teachers. Moreover, a significant factor of this cooperative group activity was that the students made group decisions that required them to locate, sort, and evaluate information to improve work effectiveness.

The purpose of Week 2 was for the students to complete a posttest on using the automated card catalog (see Appendix A). The writer distributed tests and pencils to the students. Then the writer explained the directions and stated that anyone who did not master the test with at least 80% accuracy would have to return to the media center during recess for extra help. After completing the instructions for taking the test, the writer took the students to the computer lab to use the automated card catalog. The

teacher stayed in the media center to check students' work as needed. The writer and computer lab instructor remained in the lab to observe and assist as needed.

Students who mastered the test with 100% accuracy became mentors to those who needed extra help. They worked during their afternoon recess with students who needed extra help in the media center. Upon finishing the test, all students received coupons for one free item at the spring book fair. The completion of the test was a cornerstone of the final unit of study.

The focus of Week 3 was to examine and explore the efficacy and utility of the use of the CD-ROM encyclopedia as an information source for students. The writer used the multimedia projector with the computer to give an initial demonstration of the different features of the electronic encyclopedia. A question and answer session followed, and then the writer took the classes to the computer lab to explore independently the electronic encyclopedia. The teachers, the writer, and the computer lab instructor assisted individual students as needed. Three fifth-grade students were available during the sessions to serve as mentors.

All students found the CD-ROM encyclopedia user friendly and had little trouble moving around in the different areas during this initial session. They were very excited and wanted to return during recess to explore further.

The next four weeks involved the fourth-grade students working on a CD-ROM encyclopedia unit. There were four lessons in the unit and a different lesson was introduced each week. All of the activities were completed in the computer lab.

During Week 4, the writer introduced CD-ROM Encyclopedia Lesson 1 (see Appendix D), which involved locating and reading information to answer questions on

different animals. The writer distributed worksheets and pencils to the students and explained the directions. After a short question and answer period, the students eagerly began their assignment. The writer, the teachers, and the computer lab instructor observed and assisted as needed. Three fifth-grade mentors gave assistance periodically. Those students who did not complete the assignment returned during their afternoon recess to finish.

The writer and the teachers were surprised that little assistance was needed. The students searched and read the information on the computer screen. They remained focused on the assignment and appeared greatly stimulated by this new medium. In fact, students wanted to come back the next day to do more work and they did not want to wait another week to do the next lesson!

Week 1 of the fourth month proved to be another interesting experience for the students. CD-ROM Encyclopedia Lesson 2 (see Appendix D) on using the Outline feature was completed. The writer distributed the worksheets and discussed the directions. After a brief question and answer period, the students enthusiastically began their activity. The writer, the teachers, and the computer lab instructor observed and assisted as needed. Three fifth-graders were available to help.

The students enjoyed learning the process of navigating and using the Outline feature to locate information. The fifth-grade mentors welcomed giving assistance. The teachers and the writer noticed how these mentors exhibited and modeled excellent behavior when aiding and assisting students. With students teaching students, the fourth-graders quickly became skilled users. All students completed Lesson 2 during class time.

CD-ROM Encyclopedia Lesson 3 (see Appendix D) on using the Timeline feature was completed during Week 2. The writer passed out the worksheets and explained the directions. After a quick review of what a Timeline is and how to use a Timeline to find information, the students began their search. The writer, the teachers, and the lab instructor were available for assistance as needed. Three fifth-grade students served as mentors.

This lesson demanded more assistance from the writer, the teachers, the lab instructor, and the fifth-grade mentors. The students at first appeared unsure how to use the Timeline application. However, after extra hands-on practice, the students became more comfortable and efficient and completed the activity sheet independently. All students finished the activity during the allotted time. The writer announced at the end of the session that extra worksheets were available on using the Timeline. Students smiled and took an extra worksheet to complete.

The writer invited two community leaders to speak with the students. The speakers were sent a schedule of when they should visit the school to give their presentations, and the principal was given a schedule of when the community leaders would visit the school campus.

During Week 3, the students completed CD-ROM Encyclopedia Lesson 4 (see Appendix D), which focused on how to use the Atlas feature. The writer distributed the worksheets and discussed the instructions. The students listened carefully and asked several questions concerning the worksheet. The writer, the teachers, and the lab instructor observed and assisted as needed. Three fifth-grade mentors assisted.

Lesson 4 was very effective in its task of having students use the Atlas application to search for answers. Students eagerly navigated through the Atlas section to research and find appropriate information to complete their worksheets. Three fifth-grade mentors browsed around the room and assisted the fourth-grade students as needed. The mentors felt very important and needed. The writer, the teachers, and the lab instructor were very much impressed with the ability of the students to read and decipher information from the electronic encyclopedia that best answered the worksheet questions.

The students were extremely proud of their accomplishments. At the end of the four-week period, all students received free coupons for snacks during recess. The skills learned in this unit became another cornerstone of the final unit of study.

The focal point of Week 4 was that two members of the business community spoke to the students about the importance of computer technology and how it is used in their workplace. The writer prepared the media center for the speakers by setting up the multimedia projector and computer for PowerPoint presentations, adjusting seating arrangements, and checking electrical outlets and needed equipment to make sure everything was working properly. The teachers prepared their classes for the speakers and had students bring to the sessions questions they wanted to ask.

The first speaker worked for the local power company. One interesting fact that he shared was how technology had changed the way electric meters were read. Students were extremely curious about everything he discussed and were very attentive and well behaved. The speaker later commented to the writer how impressed he was with the students' questions and interest in technology.

The second community leader was a patrolman. He shared with the groups how technology aids patrolmen in tracking people who speed on the highway and how quick and efficient information is provided on a suspect. The students were inquisitive and anxious to participate in his discussion. Students wrote thank you letters to both speakers as a follow-up classroom activity.

Community leaders are excellent resource personnel for schools. The writer recognized the value of having adults share with students what they do in the workplace and how important it is for students and teachers to learn how to integrate technology into meaningful classroom lessons.

The writer met with the teachers to collaboratively plan a mini-unit integrating math and technology. They jointly planned activities that involved using technology in a classroom activity.

The purpose of Week 1 of the fifth month was to begin a three-week unit called "How Technology Has Improved The Way of Life in the United States." The first part of this activity took place in the classrooms, while the second part took place in the media center. The teachers introduced the lesson by using calculators with students to complete a math activity. Students then completed a similar math activity without the use of calculators. After completing both activities, the teachers discussed with students how technology had improved ways to do math. The students were motivated to discover other ways technology makes life easier.

In the media center, the writer read aloud a story on how technology is used. After discussing the story, the writer asked questions that focused on the different

technologies presented in the story. Students were very curious and eager to continue learning about how technology influences people's lives.

The writer met with the teachers to begin planning the final research project. During this meeting the writer and teachers shared their individual ideas as they worked to establish common goals for the project.

The students completed Lesson 2 of the mini-unit called "How Technology Has Improved the Way of Life in the United States" during Week 2. Before visiting the media center, the teachers divided their classes into groups of three. The writer introduced the lesson by reviewing different ways technology is used today. Then students were assigned different states to research. The writer distributed worksheets and pencils. Directions were explained and discussed. Students used books, newspapers, printed encyclopedias, electronic encyclopedias, and the automated card catalog to assist them with their research. The writer and teachers monitored and assisted as needed.

The writer and teachers observed the groups discuss and share numerous reference materials with other students. Moreover, students dealt with multiple resources, addressed a variety of issues and perspectives, and presented information using a variety of formats. This was a positive way of applying cooperative learning. The writer was very flexible with this assignment. Students who did not complete their research were invited to return to the media center at their convenience. The students enjoyed this group activity. Afterwards, the writer and teachers continued their collaborative planning for the upcoming research project.

During Week 3, the writer demonstrated to the students how to use the word processor. First, the writer illustrated the different features used in a word processing program by using a multimedia projector and a computer. The demonstration was followed by a question and answer period. Next, the writer instructed students to use their data collection sheets to compose a one-paragraph report.

After students completed their reports, the writer took them to the computer lab to type and print them. The students opened the word processing program and began typing their paragraph. The writer, the teachers, the lab instructor, and the part-time computer lab assistant were available to help students as needed. Two fifth-grade mentors who were efficient in using the word processor assisted.

The students managed the mechanics of using a word processor well, but their typing skills had not been developed adequately. This caused them to take much more time than the writer anticipated to type the short paragraph, but the writer was flexible with this assignment. Students were allowed to return to the lab or media center any time during the next three days to finish their assignment, and they were responsible for turning in the printed paragraphs to their teachers. They did so without difficulty. Typing and printing a paragraph was a new experience for the students and they begged to do more. At the end of the three-week unit, the writer celebrated its success by giving students paperback novels. The skills learned in this unit became another cornerstone of the final research project. In addition, the writer and fourth-grade teachers jointly completed their final plans for the upcoming research project.

During Week 4, the students began their final unit of study called "Fourth Grade On Tour Around The World." The writer read aloud a multicultural story to the

students. After discussing the story, the writer explained the upcoming events to the students. Groups of four had been established in the classrooms. The teachers allowed each of their groups to choose a country to tour.

Week 1 of the sixth month proved to be a tremendous success. The students made passports. The writer explained why passports are needed and then shared an authentic passport. Next, the teachers allowed students to use a digital camera to take pictures of each other. After the pictures were printed and returned to the students, they were ready to design their passports. From this point on, the students worked with their assigned groups.

The writer had workstations set up in the media center for each group. They were given construction paper, glue, scissors, markers, and other needed items. Each group had a sample passport to use as a guide for making their own. The collaborative manner in which the groups worked was inspiring to the writer and the teachers as they observed. The students working together on this activity was a unique way to promote social integration and teamwork. Most groups did not finish making their passports during the assigned period. The writer had no trouble getting them to return later to complete the activity. The writer left the workstations set up until all groups had finished.

The focus of Week 2 was for the students to search for recipes representative of their countries. The writer reminded students to use the search strategies taught in previous units. The students used the automated card catalog, printed materials, the CD-ROM encyclopedia, and the Internet to locate recipes. Groups worked cooperatively during the research periods, and they were responsible for collecting their

recipes and placing them in their folders. The writer reminded the students that their recipes would be used for the "tasting party" at a later date.

The purpose of Week 3 was to continue the ongoing research activities with the students. They worked collaboratively in their groups to collect information about their countries. The writer gave students an outline of information to include in their reports. The teachers suggested that each group divide the outline among its members, complete individual research, and compile information. Members in each group decided how they would divide the outline. The writer reminded the students to use the search strategies taught in previous lessons. The writer and the teachers observed and assisted students as needed. Materials were collected and stored in the students' folders at the end of the sessions. This was an ongoing activity.

During Week 4, the students came into the media center and immediately got into their groups and began to work. They worked independently with the writer and fourth-grade teachers monitoring, observing, and assisting as needed.

It was exciting to watch the groups work. They were pleased with themselves and the pleasant working atmosphere was conducive to learning. The teachers and the writer browsed and questioned groups to check their progress. The writer reminded the students that they might visit the media center anytime to work on their reports. The writer gave the students new pencils at the end of the session. This was an ongoing activity.

During Week 1 of the seventh month, the students worked cooperatively in their groups to summarize their reports. This was an important day. They met in the media center to share their work and discuss ideas on how to present their reports. The writer

and teachers checked different groups as they worked and gave suggestions as needed. Extra time was given to revise and complete reports. At the end of the sessions, students returned their completed reports to their folders. The students exhibited pride in their work and accomplishments. They were smiling from "ear to ear" when they left the media center.

The focus of Week 2 was to allow the students to use a word processing program to type and print their reports. The writer reminded the students to use the word processing skills learned in previous sessions. The writer, the teachers, the lab instructor and her assistant, as well as two experienced fifth-grade typists, were available for help. Most of the students did not complete the assignment during the allotted time. The computer lab instructor invited students to return to the lab anytime during the week to work on their reports. The writer gave students rulers as they turned in their completed work. Also, the writer bought snacks at the end of the week for the teachers, the lab instructor, the aide, and the fifth-grade students who served as mentors.

The purpose of Week 3 was for the students to cooperatively work in their groups to choose and print several pictures that included a map, a flag, and other interesting events from their chosen countries. Groups located at least two books about their countries and then they discussed which pictures would be the best choices for enhancing their projects. Next, the teachers took their groups into the media center mini-lab to use a scanner. A spin-off from this unit was for the writer to teach the teachers how to use a scanner. They each learned how to operate a scanner during a short afternoon session. Now they could explain and demonstrate the process to their students. All of the students were fascinated with this technology. They were very

impressed with their teachers' ability to scan their pictures and help them print them. All groups completed this portion of the activity and stored their photos in their folders. This was an on-going activity.

During Week 4, the students relished working cooperatively with other group members to cut out their pictures and paste them on construction paper, and then write a caption for each illustration. The writer and the teachers monitored, observed, and helped groups as needed.

The writer met with the teachers to discuss and plan for the upcoming "tasting party." Invitations to attend the party were issued to the school principal, the assistant principal, the computer lab instructor, the superintendent, and the fifth-grade mentors.

Week 1 of the eighth month incorporated cooperative and collaborative planning. Students worked in their groups to discuss how they would dress to represent their countries and to decide what special foods they would bring. The groups studied their recipes and then chose different recipes to take home to see if a family member could help them prepare the dishes for the "tasting party." The teachers sent letters home with the students explaining what the "tasting party" was and when it would take place. The students returned their signed letters giving them approval for making the dishes and bringing them on the assigned day.

Many students were concerned that they might not be able to dress in a manner representative of their countries. Therefore, the teachers and the writer decided to make this part of the activity optional.

During the students' planning session, the teachers and the writer observed and assisted as needed. Little assistance was given as the groups dialogued with each other.

The writer reminded all students to visit the media center at any time to complete any unfinished work.

An additional activity took place in the classrooms. Teachers allowed their students to bind their multicultural recipe books (see Appendix H). Not only was this an exciting activity, but the students learned how to use a binding machine, which is another use of technology. The completed recipe books were a source of pride for the students.

The "multicultural tasting party" took place during Week 2. The writer prepared the media center for the party by arranging the library tables appropriately. Students came to the media center at assigned times to decorate their tables. Table cloths, paper, marking pens, blank name tags, etc. were provided by the writer. The groups designed unique table centerpieces and placed them on the tables.

The day finally arrived for the "tasting party." The excitement and response from the children's family members was astounding. There was so much food available that the writer issued an invitation for all faculty and staff to attend. Many of the parents offered to stay and assist as needed.

Before the actual tasting party began, several of the other classes came to see all the different foods that had been prepared. Students in these classes echoed that they could not wait to be in fourth grade so that they could study different countries and have a "tasting party."

As the party progressed, the teachers and the writer observed that the fourth graders were truly enjoying this experience. Many of the students did not want to try some of the dishes, but their teachers reminded them that a tasting party was all about

tasting new dishes. Students did not receive a large helping of any dish but received only a taste so that they could experience what people from different cultures ate. The tasting party was highlighted in the school's monthly newsletter (see Appendix I).

The writer announced in the local paper and the school's newsletter that "Fourth Grade On Tour Around The World" research projects and display boards would be featured at the Family-Teacher meeting. The writer included the appropriate date and time and invited parents, community leaders, and administrators, as well as faculty and staff to attend.

During Week 3, the students' research projects and display boards were completed. This activity took place in the classrooms and the teachers were in charge. The writer encouraged students to visit the media center as needed to get supplies or to use information resources.

During Week 4, the students presented their research projects and display boards (see Appendix J) to their parents and other students during a special program that took place in the media center. The writer and teachers worked cooperatively to prepare these students to be presenters. The majority of the students had never had this experience. Each group member had to present and tell something interesting and factual about his or her country. During the program, all other students had to be respectful of their classmates and listen attentively. The writer evaluated students by using a research project checklist (see Appendix F).

After the final presentation, the writer gave a PowerPoint show of different happenings that had taken place during the implementation experience. Throughout the implementation period, the writer, teachers, and students took digital pictures. The

teachers and the writer collaboratively composed this presentation at an earlier date. The children were fascinated as they watched and remembered different activities that they had taken part in throughout the year.

As part of the culminating activity, the writer presented students with certificates and "treat" bags as rewards for their accomplishments and hard work. The writer gave the teachers gift certificates to a local restaurant in appreciation of their hard work, their cooperation, and their valuable time. All four teachers pledged to continue to promote the appropriate uses of technology to reach the objective of integrating technology into the curriculum.

Chapter V: Results

Results

The problem at this writer's school was that the fourth-grade teachers were not integrating computer-related technology into the curriculum. The goal of this applied dissertation experience was that fourth-grade teachers would successfully integrate computer-related technology into the curriculum. The writer chose to combine several solution strategies to address the problem. They included the following: to teach computer and research skills to the students, to provide ongoing computer-related training for teachers at the workplace, to collaborate with teachers to plan units of study, to provide peer tutoring for students and teachers, and to invite community leaders and parents to share their knowledge and interest in technology. There were seven projected outcomes for this applied dissertation experience:

Outcome 1. Sixty-two of 72 fourth-grade students will use the automated card catalog to find information.

This outcome was met.

All 72 fourth-grade students participated. The results of the automated card catalog posttest (see Appendix A) were complied and compared with the automated card catalog pretest (see Appendix A) results. The results of the posttest showed that 64 of the 72 fourth-grade students got at least 80% of the test correct. The writer scored each test and counted to see if at least 62 students met the requirements. The 8 students who did not achieve this goal received retraining by four fourth-grade students who did achieve 100% on the posttest.

Outcome 2. Sixty-two of 72 fourth-grade students will use appropriate search strategies to locate related articles to find specific information in a CD-ROM encyclopedia.

This outcome was met.

All 72 fourth-grade students participated. The results of the four CD-ROM encyclopedia lessons (see Appendix D) showed that 63 fourth-grade students correctly answered at least 80% on each worksheet. The writer scored each worksheet and counted to see if at least 62 students met the requirements. The 9 students who did not achieve this goal received retraining on the items missed during recess in the media center. Three fifth-grade students and six fourth-grade students were mentors during this time.

Outcome 3. Fifty of 72 fourth-grade students will use a word processing program and successfully type and print a paragraph.

This outcome was met.

All 72 fourth-grade students participated. The results of the creation of a one-paragraph typed report showed that 72 fourth-grade students successfully used a word processing program to compose, edit, save, and print.

Outcome 4. Four of 4 fourth-grade teachers will use computer-related technology to teach.

This outcome was met.

All 4 fourth-grade teachers participated. The writer observed and marked the Presentation Skills Performance Checklist (see Appendix E) while each classroom

teacher taught a lesson using PowerPoint software. All 4 of the fourth-grade teachers achieved 100% accuracy.

Outcome 5. Four of 4 fourth-grade teachers will plan lessons collaboratively with the writer.

This outcome was met.

All 4 fourth-grade teachers participated. The writer's lesson plan book was checked at the end of the 15th week of implementation to see if 4 of the 4 fourth-grade teachers had planned lessons collaboratively with the writer. The plan book indicated that collaborative planning for jointly planned lessons or units occurred weekly during the 4 teachers' planning periods.

Outcome 6. Four of 4 fourth-grade teachers will collaborate with the writer in developing a unit of study that includes a student research project.

This outcome was met.

All 4 fourth-grade teachers participated. The results of this outcome ensured that all 4 fourth-grade teachers collaboratively and continuously planned and cooperatively participated with the writer to develop and conduct a technology-related student research project.

Outcome 7. Sixty-two of 72 fourth-grade students will complete a research project based on the unit of study described in Outcome 6.

This outcome was met.

Sixty-eight fourth-grade students participated. During the eighth month of implementation, 4 students moved. The results of the Research Project Checklist (see

Appendix F) were compiled and showed that 68 fourth-grade students got at least 80% of the checklist items correct.

Discussion

The writer was astonished that the results of the applied dissertation experience not only met the projected outcomes but surpassed expectations. The writer expected the fourth-grade teachers to use PowerPoint software occasionally; instead 3 of the 4 teachers integrated this presentation software tool into their lessons at least six times. This was a dramatic improvement from the 1999-2000 school year, in which none of the fourth-grade teachers knew how to use PowerPoint software. The fourth-grade students were like sponges soaking up water; but in this case they were soaking up knowledge. It was amazing how eager they were to learn. Never during the entire implementation period did the writer hear a student complain about doing any of the assigned activities. The teachers and students worked very hard throughout the implementation period.

There were many unanticipated accomplishments as a result of this applied dissertation experience. All 4 teachers learned how to use a scanner, establish email addresses, and become technology mentors to their co-workers. All fourth-grade students learned how to use an Ellison letter machine and how to bind a book. A majority of the students learned how to use a digital camera. One teacher allowed several of her students to create PowerPoint presentations.

There were some roadblocks and frustrations along the way as well. The writer discovered that teachers did not master technology overnight. "Technology is not readily assimilated into teachers' existing routines" (Ertmer, 1999, p. 47). In the

beginning, 2 of the 4 fourth-grade teachers did not think they had time to plan weekly technology-related lessons collaboratively with the writer. These teachers came to realize that technology was not an additional course to teach and technology was not taught only by the computer lab instructor. It was a part of the curriculum. The teachers needed to learn to integrate (Irwin & Robinson, 2000). For example, instead of just using their social studies books to study the Great Depression, students could retrieve information from print sources, electronic encyclopedias, and the Internet. They could use a word processor to create a multi-page newspaper by incorporating different sources, and they could use a scanner to scan pictures. This type of activity incorporates objectives found in all of the elementary subject areas; at the same time, students gain invaluable knowledge and technology skills.

Another roadblock occurred with scheduling the computer lab for teaching the electronic encyclopedia unit. The computer lab instructor changed her time schedule of working with the fourth-grade students. In the past, the students had visited the lab one day per week during their physical education classes, but this year the lab instructor worked with the same group of students for a three-week period and then rotated another group into the lab. After some compromise and planning with another set of teachers, the writer was able to work out a different time schedule for using the lab for the lessons. The lab instructor was agreeable with the changed time schedule. Senge (1990) stated that a special relationship develops among colleagues who enter into dialogue regularly. Open communication in a school allows joint decisions to be made for the benefit of the children.

One insight the writer gained from this project was that children are eager to learn when using technology. For example, the electronic encyclopedia unit was an enjoyable experience for the fourth-grade teachers and students. Most students said that gathering data from the CD-ROM encyclopedia was easier and quicker than using print encyclopedias, and they remembered the information better. The skills of accessing and retrieving vast amounts of information that the students learned were valuable. The students were highly motivated throughout the four-week period. The CD-ROM encyclopedia appeared to have very strong attracting and holding powers. It was apparent to the teachers and to the writer that students responded positively to the electronic encyclopedia and that it could be put to effective use in many ways during classroom lessons. According to Poole (1997), it takes different approaches to help children assimilate knowledge. CD-ROM technology with text, full color illustrations, and sound proved to be an effective medium to help children read.

Another unanticipated issue occurred when the writer introduced the word processor to the fourth-grade students. They were very eager to type and print their paragraphs and reports. The writer and teachers were excited about introducing a word processing program to the children. "Word processing is such a valuable tool that many people feel this single application is sufficient justification for the purchase of a microcomputer" (Merrill et al., 1996, p.121). Once the students learned the mechanics of using the word processor, they made typing corrections easily. In fact, the writer heard one student comment, "I would not mind writing assignments if I could type them." Riedesel and Clements, as cited in Forcier (1996), stated that students are more eager to write if they can type their ideas and they will use a more extensive vocabulary

because they find it easy to correct spelling. Nonetheless, the typing activities were very time consuming and laborious, because the students had no typing skills. They had great difficulty but did not give up. To remedy this problem, the writer purchased a networked typing software program with state funds. The computer lab instructor agreed to begin keyboarding lessons as soon as the program was installed.

One important, unexpected, and positive outcome the writer obtained from this applied dissertation experience was discovering that peer mentoring (tutoring) is unique in that participants learn cooperation and responsibility, a result of being empowered to teach one another. Vockell and Schwartz (1988) stated, "One obvious way to use the computer with peer tutoring is simply to let the knowledgeable peer sit next to the student who is running the computer program and provide supplementary tutoring and feedback as necessary" (pp. 59-60). This statement applies to technology integration today as well. The writer found that having mentors helping throughout the implementation period was beneficial and productive. Students enjoy learning from their peers, and, at times, they learn better and understand more. Another important factor of peer tutoring is that it is a way to help students learn leadership skills such as problem solving, communication, and teambuilding (Fiscus, 2000).

Another result of this applied dissertation experience was that teachers in other grades observed and grew interested as the writer and teachers modeled how to integrate technology into different lessons. "Modeling enables teachers to observe expert performance" (Brand, 1997, p. 4). When teachers have someone to model, it helps them to overcome their fear of trying new technologies. For example, several teachers approached the writer about showing them how to use PowerPoint software

after observing the fourth-grade teachers teaching with the presentation tool. These teachers wanted to know if they could schedule some training sessions after school. Knapp and Glenn (1996) commented that modeling is very important when educating and training teachers. The writer offered training sessions on two consecutive afternoons and several teachers attended. The writer purchased additional televisions and scan converters for each grade level in order to enable more teachers to use presentation software.

During the implementation period, other students observed as the fourth-grade students modeled appropriate use of technology. Numerous students from other classes came to the media center to make passports or to create recipe books. The writer assured these students that she would plan some technology-related lessons with their teachers. It was evident that interest in technology integration was growing in the school.

Another realization gathered from this applied dissertation experience was that as an effective collaborative learning environment increased, discipline problems decreased. As teachers passed through the media center while students were working collaboratively on an assignment, many commented on the students' good behavior and enthusiasm, as well as their ability to stay on task. Alderman (2001) said, "On-task instructional time is critical to learning" (p. 38). Good discipline is an essential ingredient for learning. Cooperative and collaborative technology-related activities have tremendous implications for improving "time on task."

Many instructional benefits can result from integrating computer-related technology into the curriculum. The writer noticed the scheduled activities promoted

active student-centered and group learning, established collaboration for learning, helped master information literacy, and increased self-confidence in working with technology. Nurturing student learning that goes beyond the curriculum and helping students become critical thinkers as well as problem solvers are essential in order to help acquire independent life-long learning skills. To be successful in the 21st century, one must possess these skills.

However, Picciano's (1998) lament regarding American education's slow reaction to technology integration is still applicable nationwide, as well as in the writer's workplace: "Yet, the vast majority of primary and secondary schools rely on intensive manual efforts to conduct one of the most important businesses, that is the education of children" (p. 5). If teachers want to make improvements, then they have to change their way of thinking (Covey, 1991). When educators are able to change their scheme of understanding, explaining, and actively teaching certain concepts, they have made tremendous breakthroughs toward integrating computer-related technology into classroom lessons. This realization summarizes the outcomes of this applied dissertation experience.

Recommendations

After completing this applied dissertation experience, the writer recommends the following:

1. Listen to students' and teachers' input and comments because they are experiencing the technology first hand. They know how they feel and learn, and their ideas will help shape and improve future computer-related technology endeavors.

2. Provide continuous ongoing computer-related training for teachers at the workplace that meets their classroom needs. Training must be grounded in the mundane but practical details of teachers' daily work lives.
3. Create teacher and student peer mentoring teams within the school. Learning results from interaction among learners, and learners accomplish more from and with others than alone.
4. Model good use of technology. Modeling allows teachers to observe expert performance and helps them overcome insecurity and fear of using technology in their classrooms.
5. Strive to keep up-to-date computers and software in the classrooms because technology changes daily. Create fundraising projects within the community to support technology needs.
6. Provide incentives to encourage teachers to utilize instructional technology in their classrooms, because they need to feel good about making the effort to learn and apply new skills. Public and private recognition as well as some form of payment are ways to celebrate accomplishments.
7. Collaborate regularly with colleagues and other members of the school staff to develop instructional activities that integrate information resources in all subject areas. Students must be able to access information in all types of formats in order to achieve learning.
8. Suggest that the computer lab instructor begin keyboarding instruction at the kindergarten level. A word processing program has a significant effect on the quality of student writing.

9. Promote relationships between parents, community leaders, and the school. Parents and other adults enhance student learning by contributing personal and physical resources.
10. Attend conferences and staff development classes regularly to remain current on all issues related to the use of technology for learning and on different methods and tools for assessing school programs related to technology.

Dissemination

The writer plans to distribute the results of this applied dissertation experience in several ways. First, the writer will share the results with the school administration and faculty during a faculty meeting. The writer will then share the results with the superintendent and school board members. A technology program is much more likely to succeed when the stakeholders (superintendent and school board members) are committed to it (Poole, 1997). The writer hopes that the results of her implementation project will prove to the stakeholders that the teachers are growing in confidence and ability, and that they are utilizing computer-related technologies to promote student learning, which is the ultimate goal of the school board and education in general.

Second, the writer will share the results of this applied dissertation with the faculty of the other elementary school in the district. She will assist teachers with integrating technology into the curriculum.

Finally, the writer would like to share the results with other elementary schools in the state. She would like to write an article describing the results and submit it to an educational journal.

The writer will share the results and the recommendations of this applied dissertation with others to help them gain knowledge in how to deal with similar problems in their workplaces. Communicating and dialoguing with other educators allow all participants to explore different ways to solve issues and derive joint answers. "In dialogue, people begin to see the stream that flows between the banks. They begin to participate in this pool of common meaning, which is capable of constant development and change" (Senge, 1990, p. 242).

Students today need to know how to access and evaluate information in order to solve problems and profit from global resources. Teachers must help prepare students for the future labor market they will be entering. Teachers must offer educational experiences that deal with integrating computer-related technology into the curriculum to help students benefit from future opportunities in technology.

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Appendix A

Using The Automated Card Catalog

USING THE AUTOMATED CARD CATALOG

Test 1

Date_____
Name_____
Grade_____

Pretest_____
Posttest_____

Instructions: Please use the automated card catalog to answer the following questions. Write your answers on the test sheet.

1. Does the media center have any books written by Pam Conrad?_____
2. Who wrote A Spy in the King's Colony? _____
3. How many copies of Gregory, the Terrible Eater does the media center have? _____
4. How many books does the media center have by the author Matt Christopher? _____
5. What is the call number for The Great Brain? _____
6. Is Grandfather's Journey in or out? _____
7. Conduct a search for a list of materials on snakes and then print out this list. _____
8. Conduct a search for a list of materials on bears. Find two different examples of these materials in the media center and show them to the media specialist or the classroom teacher. _____
9. How many Newbery Medal books does the media center have in its collection? _____
10. Conduct a search for a Newbery Medal book. Find an example of one and show it to the media specialist or the classroom teacher. _____
11. Which section of the media center houses an atlas? _____
12. Locate an atlas and show it to the media specialist or teacher._____

USING THE AUTOMATED CARD CATALOG

Test 2

Date_____
Name_____
Grade_____

Pretest_____
Posttest_____

Instructions: Please use the automated card catalog to answer the following questions. Write your answers on the test sheet.

1. Does the media center have any books written by Barbara Cooney?_____
2. Who wrote The Gammage Cup? _____
3. How many copies of Socks does the media center have? _____
4. How many books does the media center have by the author Kathrine Paterson? _____
5. What is the call number for White Fang? _____
6. Is Jamestown, First English Colony in or out? _____
7. Conduct a search for a list of materials on spiders and then print out this list. _____
8. Conduct a search for a list of materials on fish. Find two different examples of these materials in the media center and show them to the media specialist or the classroom teacher. _____
9. How many Caldecott Medal books does the media center have in its collection? _____
10. Conduct a search for a Caldecott Medal book. Find an example of one and show it to the media specialist or the classroom teacher. _____
11. Which section of the media center houses an almanac? _____
12. Locate an almanac and show it to the media specialist or teacher._____

Appendix B

Computer Skills Checklist

COMPUTER SKILLS CHECKLIST

DATE:_____

NAME:_____

GRADE:_____

1. Can turn the computer on and off. YES OR NO
2. Can load a disk into the computer. YES OR NO
3. Can save data onto a disk. YES OR NO
4. Can edit using delete, backspace, cut, and paste commands. YES OR NO
5. Can place fingers correctly on the home keys. YES OR NO
6. Can enter Microsoft Works or another word processing program and type a paragraph using proper keyboarding techniques within a given time period. YES OR NO
7. Can locate articles in Encarta or a similar CD ROM encyclopedia and find related articles. YES OR NO
8. Can print a document on a printer. YES OR NO
9. Can import a graphic. YES OR NO

Appendix C

Teacher Survey of Computer Use

Teacher Survey of Computer Use

Date_____

Grade Level_____

Subject (s) _____

Please rate the following questions according to the Likert scale below:
1-Strongly Disagree 2-Disagree 3-Neutral 4-Agree 5-Strongly Agree

1. I know enough about computers to integrate them into my classroom curriculum.
   1 2 3 4 5
2. I see myself as one of the more knowledgeable computer users in my school.
   1 2 3 4 5
3. I feel comfortable sharing my knowledge about computers with other staff members.
   1 2 3 4 5
4. I feel comfortable using the computer with my class.
   1 2 3 4 5
5. I feel tense when people start talking about computers.
   1 2 3 4 5
6. I have attended in-services that focus on instructional technology.
   1 2 3 4 5
7. I integrate computers into the following:
   Reading: 1 2 3 4 5
   Writing: 1 2 3 4 5
   Science: 1 2 3 4 5
   Math: 1 2 3 4 5
   Soc Studies: 1 2 3 4 5
8. I like to teach with computer technology.
   1 2 3 4 5
9. I rely on others to inform me about new software.
   1 2 3 4 5
10. When using computers, the teacher becomes the facilitator instead of the teacher.
    1 2 3 4 5
11. I think that using computer technology for instruction will help improve my students' performance.
    1 2 3 4 5
12. I think computer instruction is just another fad.
    1 2 3 4 5
13. My school has helpful in-services for integrating computers into the curriculum.
    1 2 3 4 5
14. Technology should be taught in a context that's separate from the curriculum.
    1 2 3 4 5

15. I feel that I have had adequate training in using computers.
    1 2 3 4 5
16. I believe that I effectively use the computer in my classroom.
    1 2 3 4 5
17. The greatest barrier to using the computer is time.
    1 2 3 4 5
18. I spend as much time preparing for my computer lab time as I do for my other lessons.
    1 2 3 4 5
19. I have previewed all software before using it with my class.
    1 2 3 4 5
20. I feel that my students know more than I do about computers.
    1 2 3 4 5
21. I have and use a personal email account.
    1 2 3 4 5
22. Please explain the role that computers play in your classroom.

23. What would you like to learn more about on computers?

Appendix D

CD-ROM Encyclopedia Lessons

CD-ROM Encyclopedia Lesson 1

Name_____

Grade_____

Open CD-ROM encyclopedia and click on Search.

Type in: **Lemur.**

Press Enter.

Click on the paper Icon.

Read the article and answer these questions:

From what family is it? _____

What does it eat?_____

Where does it live?_____

Click on the picture icon.

Click on the caption and write down one fact from the caption.

_____

_____

_____

Now look up 2 other animals and answer the questions.

Lion:

Describe its body.

_____

_____

What does it eat?

Where does it live?

Elephant:

Describe its body.

What does it eat?

Where does it live?

CD-ROM Encyclopedia Lesson 2

Name_____

Grade_____

Open electronic encyclopedia and look up an article on **bird.**

Click on the OUTLINE icon.

Copy the main headings from the outline.

_____

_____

_____

_____

_____

Click on the word NUTRITION. Write down what birds eat.

_____

_____

_____

Click on the OUTLINE icon.

Click on the main heading IMPORTANCE OF BIRDS. Read this section and tell why birds are important.

_____

_____

Now click on the put-away boxes in the upper left-hand corner of screen until you get back to the main menu. Look up **turtle.**

Use the Outline icon to find CHARACTERISTICS. Describe some of the turtle's physical characteristics.

Now use the Outline icon to look up FEEDING. Describe how turtles eat and what they eat.

Now click on the picture icon. What else can you learn about a turtle from this icon? Write 2 facts.

CD-ROM Encyclopedia Lesson 3

Name_____

Grade_____

Use the TIMELINE to find out some important things that happened in the year you were born. If your year is not listed, then go to the closest year.

I was born in

_____.

What the timeline says happened during this year:

_____

_____

Now click on the NOTE-PAPER icon and read the article to understand more about this event. Write one fact in a complete sentence.

In the year I was born,

_____

_____

_____

_____

What does A.D. mean?

_____

What does B.C. mean?

_____

Go back to the TIMELINE and scroll down and see if you can find one interesting thing that happened in:

The 1980s A.D.

_____

The 1970s A.D.

_____

The 1960s A. D.

_____

Keep scrolling up and down through the TIMELINE and find one interesting thing that happened in:

The 1800s A.D.

_____

The 1500s A.D.

_____

Be Careful!

The 300s B.C.

_____

The 500s B.C.

_____

The 1000s B.C.

_____

The 2000s B.C.

_____

The 5000s B.C.

_____

CD-ROM Encyclopedia Lesson 4

Name _____

Grade _____

Open the electronic encyclopedia and click on **Atlas.**

Find the capital cities of the following countries in **The Americas:**

Venezula_____

Chile_____

Mexico_____

Choose another country in **The Americas** and find the capital:

_____

Find the capital cities of the following countries in **Asia:**

China_____

Japan_____

Mongolia_____

Choose another country in **Asia** and find the capital:

_____

Find the capital cities of the following countries in **Africa:**

Egypt_____

Kenya_____

Libya_____

Choose another country in **Africa** and find the capital:

_____

Find the capital cities of the following countries in **Europe:**

England _____

France _____

Scotland _____

Choose another country in **Europe** and find the capital:

_____

Click on the Countries in **Asia:**

Click ONE TIME ONLY on Japan and press ENTER.

Click on the **texts** icon.

Click on the **Related Media** icon to see some scenes of Japan.

Click on Back box until you get back to the Countries of Asia Map screen.

Scroll down until you see Mongolia.

Click ONE TIME ONLY on Mongolia and press ENTER.

Click on the text icon.

Click on the **Related Media** icon to see different scenes of Mongolia.

Click on Back box until you return to beginning screen.

Appendix E

Presentation Skills Performance Checklist

Presentation Skills Performance Checklist

Date_____
Name_____

Directions: The elementary teacher will be observed and evaluated by the instructor of the training class. On the checklist, Yes indicates the teacher has accomplished the performance skill and No indicates an inadequacy of that particular skill. Retraining will need to be done on any skill not accomplished.

Performance Skill	*Yes*	*No*
1. Topic selected is appropriate for the unit of study.		
2. All slides support the main idea.		
3. Order of slides is clear to the audience.		
4. Style is legible, simple, and consistent.		
5. Slide show has suitable graphics.		
6. Slide show has appropriate sound.		
7. Slide show has appropriate color: Uses no more than 4 different colors.		
8. Consistent use of fonts throughout the presentation: Uses no more than 2 or 3 fonts per visual.		
9. Smooth sequencing and flow of lesson.		
10. Written text is free of errors.		
11. Spoken parts are interesting and understood by audience.		
12. Slide show allows for interaction with audience.		

Appendix F

Research Project Checklist

Research Project Checklist

Date_____

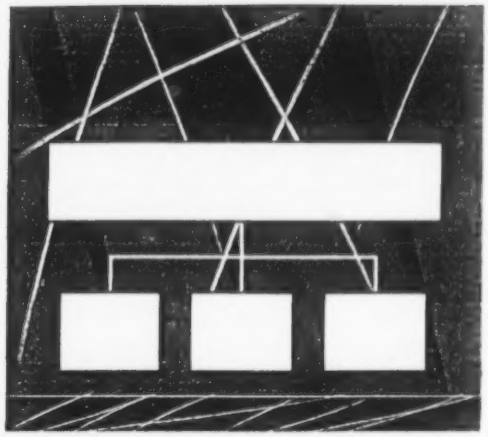
Name_____

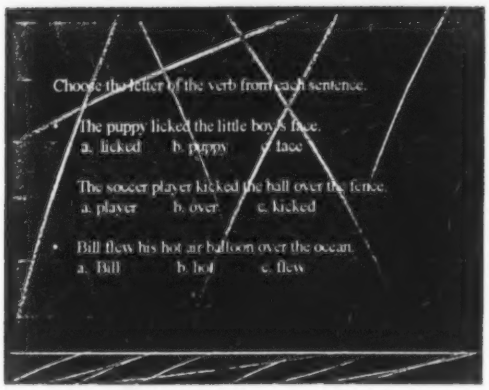
Directions: The student will be observed and evaluated by the instructor of the class. On the checklist, Yes indicates that the student has accomplished the skill and No indicates an inadequacy of that particular skill. Correctly finishing 8 of the 10 checklist items will be considered successful completion of the research project.

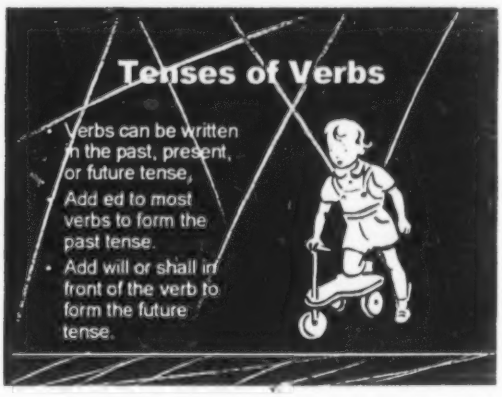
Performance Skill	*Yes*	*No*
1. Passport is appropriate for the unit of study.		
2. Illustrate country's national flag.		
3. Illustrate map of country.		
4. Illustrate another interesting fact about country.		
5. Recipe Book is representative of country.		
6. Complete and type research report.		
7. Research report is informative.		
8. Oral presentation is interesting and understood by audience.		
9. Project board captions are legible.		
10. Project board display is eye-catching and neat.		

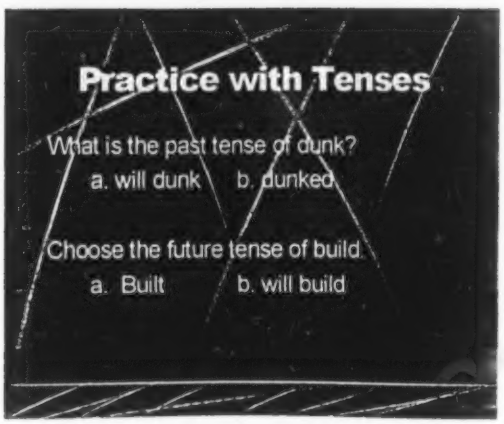
Appendix G

Sample of a Teacher-Created PowerPoint Lesson




Choose the letter of the verb from each sentence.
The puppy licked the little boy's face.
a. licked b. puppy c. face
The soccer player kicked the ball over the fence.
a. player b. over c. kicked
Bill flew his hot air balloon over the ocean.
a. Bill b. hot c. flew


Tenses of Verbs
Verbs can be written in the past, present, or future tense,
Add ed to most verbs to form the past tense.
Add will or shall in front of the verb to form the future tense.


Practice with Tenses
What is the past tense of dunk?
a. will dunk b. dunked
Choose the future tense of build.
a. Built b. will build

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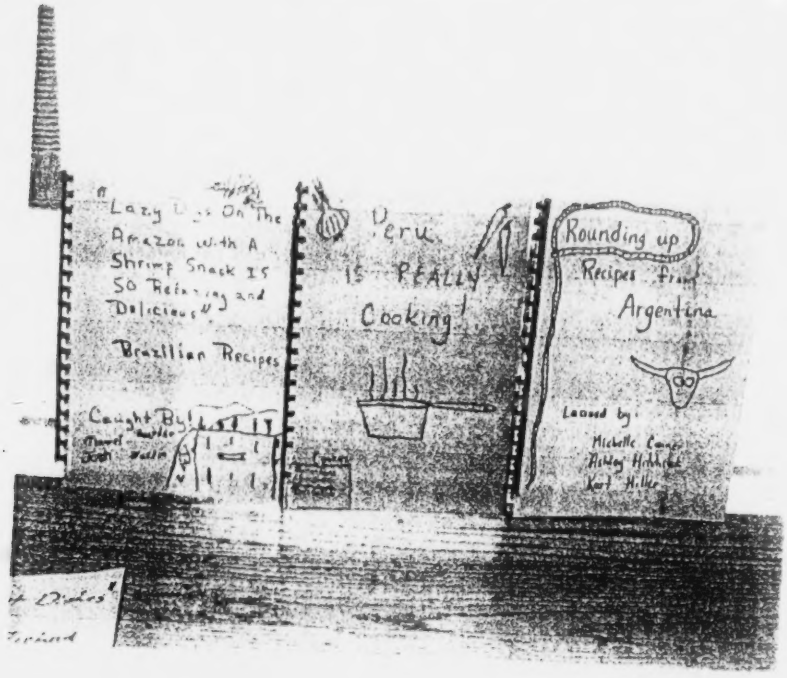
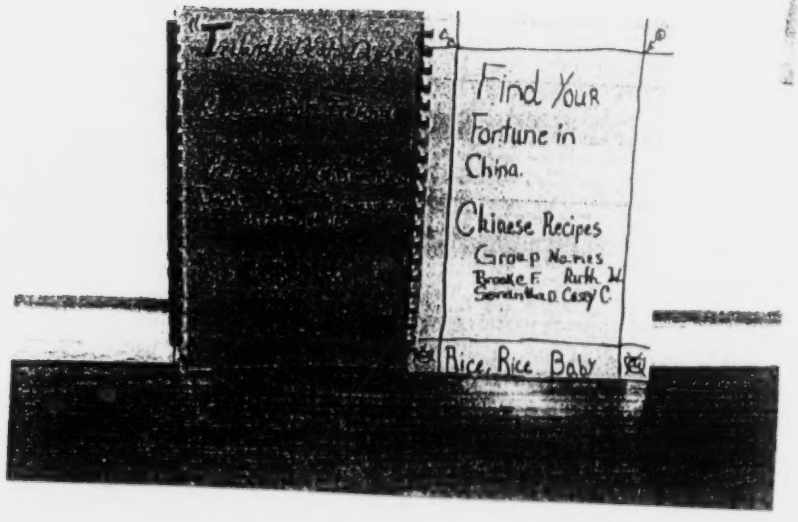
Appendix H

Samples of Student-Created Recipe Books





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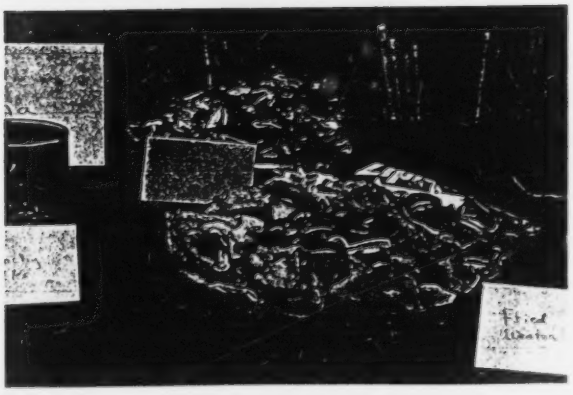
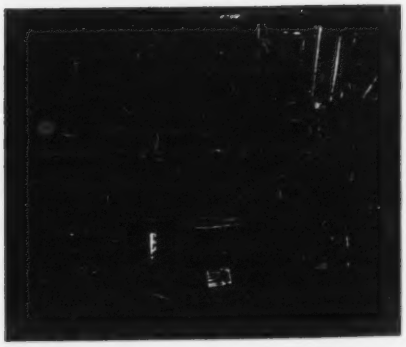
Appendix I

Sample of a School Newsletter

Everyone enjoyed the "Multicultural Tasting Party" held in the school library media center on March 9, 2001. The fourth-grade students sponsored the party. It was a lot of hard work but a lot of fun! Parents, students, and teachers participated in helping to make the party a success. The unique dishes brought in were representative of 17 countries the students have been studying. These students have been working on research projects focusing on these countries, and the projects will be on display in the media center during the week of March 26, 2001. Please come by and take a look at these projects any time between 8:00am and 3:00pm.





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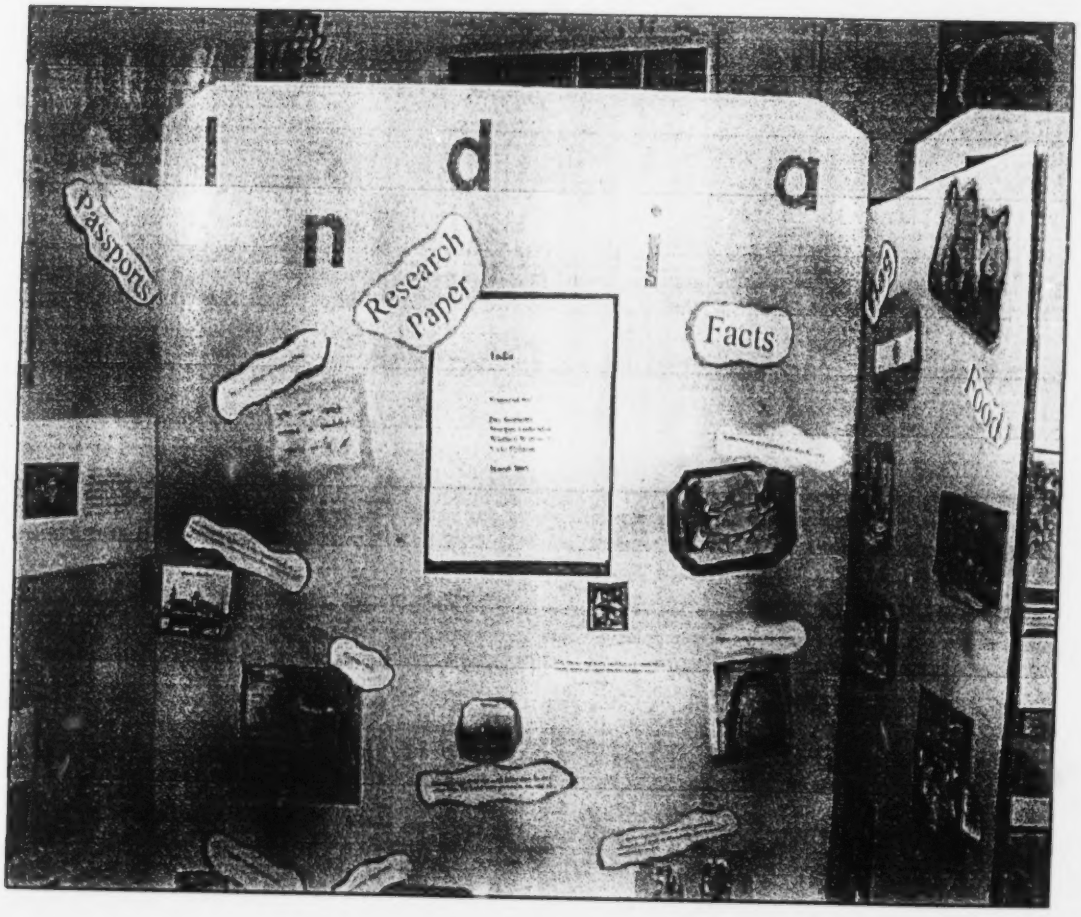
Appendix J

Sample of a Student-Created Research Project Display



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